FOREST INSECT AND DISEASE CONTROL
STATE AND PRIVATE FORESTRY

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BIOLOGICAL EVALUATION
Douglas-fir Beetle

Targhee National Forest
1974

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INTRODUCTION

The Douglas-fir beetle infestation on the Targhee National Forest has caused scattered Douglas-fir mortality over much of the fir type on the Forest. Following the buildup of the beetle population in storm damaged trees, tree killing has increased each year in both extent and intensity. Heaviest losses have occurred north of Sheridan Reservoir and along Big Bend Ridge. New areas of scattered mortality were recorded this year.

During August 21-28, 1974, ground surveys were conducted in eight Douglas-fir stands of known infestation. The aerial detection survey was flown the week of August 26, 1974.

TECHNICAL INFORMATION

INSECT: Douglas-fir beetle, Dendroctonus pseudotsugae Hopkins. (Coleoptera:Scolytidae)

HOST: Douglas-fir, Pseudotsuga menziesii (Mirb.) Franco.

TYPE OF DAMAGE: Killing of Douglas-fir. Mortality is heaviest among the large trees and commonly occurs in groups.

EXTENT OF OUTBREAK: Tree killing has occurred over most of the Douglas-fir type on the Forest. Conspicuous losses are on Big Bend Ridge, Bishop Mountain, Twin Creek and north of Sheridan Reservoir (Figures 1, 2, and 3). A noticeable increase in tree killing was recorded during the aerial survey from Baker Draw south to Warm River Butte. See the appended maps for the complete survey record.

LOCATION: Targhee National Forest, southeastern Idaho.

GENERAL INFORMATION

Douglas-fir mortality has increased each year since the infestation was triggered by storm damaged trees in 1969. Although many of the damaged trees were removed prior to beetle flight in the spring of 1970, large numbers of green trees were attacked in 1970. By 1973 Douglas-fir beetle caused losses ranged from one to sixteen trees per acre.[1/]

A marked increase in the extent of the infestation was recorded during the 1974 aerial survey. Increased numbers of new faders (1973 attacks) were noted in the following areas: Sawtell Peak, Meadow Creek, Frog Butte, Baker Draw, Flat Canyon, Anderson Mill Canyon, and Coleman Canyon.

BIOLOGICAL INFORMATION

On-the-ground surveys were conducted in eight infested areas during August 21-28, 1974. Dead Douglas-fir six inches d.b.h. and larger, was recorded on one half by ten chain strip plots. Live Douglas-fir and other live trees were recorded on variable plots (10 BAF). A variable plot was located at the end of each strip plot. In each area the number of plots varied from ten to sixteen of each type depending on the topography and available time. Plot data from each area were converted by computer program to trees per acre and the results are tabulated below:

	Trees per acre*				
Area	Live	1974 Hits	1973 Hits	1972 & Before	Nonhost Live	Host % Dead
Thurburn Ridge	37.0	0	0	1.0	19.6	2.7
Reas Pass Creek	59.9	0	0.5	1.8	22.4	3.7
Twin Creek	79.0	2.8	0.2	3.8	5.7	7.9
East Hotel Creek	61.6	0.2	0.4	1.4	53.2	3.1
Blind Creek	75.5	1.2	0.6	2.0	5.8	4.8
Snyder Creek	61.9	3.0	1.4	3.0	47.2	10.7
Taylor Creek	64.9	4.5	5.3	1.0	32.5	14.3
Howard Creek	80.3	0.7	4.4	1.8	12.2	7.9

* These data are summarized by diameter class in the Appendix (tables 1-8).

[1/] Stipe, L. E., 1973 Biological Evaluation, Douglas-fir beetle infestation, Targhee National Forest, USDA, Forest Service, Timber Management, Ogden, Utah, 3pp typed.

For the combined eight cruise areas there were 1.5 new attacks per acre and 1.6 old hits (1973 attacks) per acre. This represents an attack ratio of .94 new to 1 old. This decrease in trend, although slight, is the first recorded since the infestation began.

Cumulative mortality for the eight cruise areas was 3.6 trees per acre with an additional 1.6 currently infested. Dead and currently infested trees represent 6.9 percent of the host type.

No unusual brood conditions were found during the survey. Egg galleries were well established with attack densities ranging from moderate to heavy.

DISCUSSION

In accord with the beetle's normal ability to sustain itself in standing green trees for three to four years, the number of new attacks decreased during 1974. This decline occurred following the beetle's fourth generation in standing trees. Tree killing will continue to decrease over the next few years unless renewed by additional breeding material in the form of storm damaged trees.

Relative to other bark beetle infestations, tree losses per acre have not been high (approximately 7 percent of host type). However, due to the beetle's preference for large trees, a much larger proportion of the volume has been killed. Using 20 inches d.b.h. as an arbitrary division between large and small trees, there are 3.7 (25.5 percent) dead trees per acre 20 inches and larger, and only 1.5 (2.7 percent) dead trees per acre under 20 inches. This not only shows the beetle's preference for large trees, it also indicates the volume lost is disproportionate to the number of stems killed per acre.

Although the infestation has reached its peak and has started to decline, many stands remain that are highly susceptible to bark beetle attack. Only through long range management can the susceptibility of these stands be reduced. Under current logging practices the trend of an outbreak cannot be significantly changed. Logging in infested stands during an outbreak may only influence the beetle population in the immediate area, and only be effective for one year. The only real benefit of logging during an infestation is to harvest threatened and infested timber that would otherwise be lost.

RECOMMENDATIONS

1. Concentrate logging in areas having highest concentrations of mature and overmature Douglas-fir timber.

2. Remove currently infested trees where access is available (along roads and edges of clearcuts, near active timber sales, etc.).

3. Remove as much of the large diameter windthrow as possible before broods emerge.

4. Do not use direct control methods.

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APPENDIX

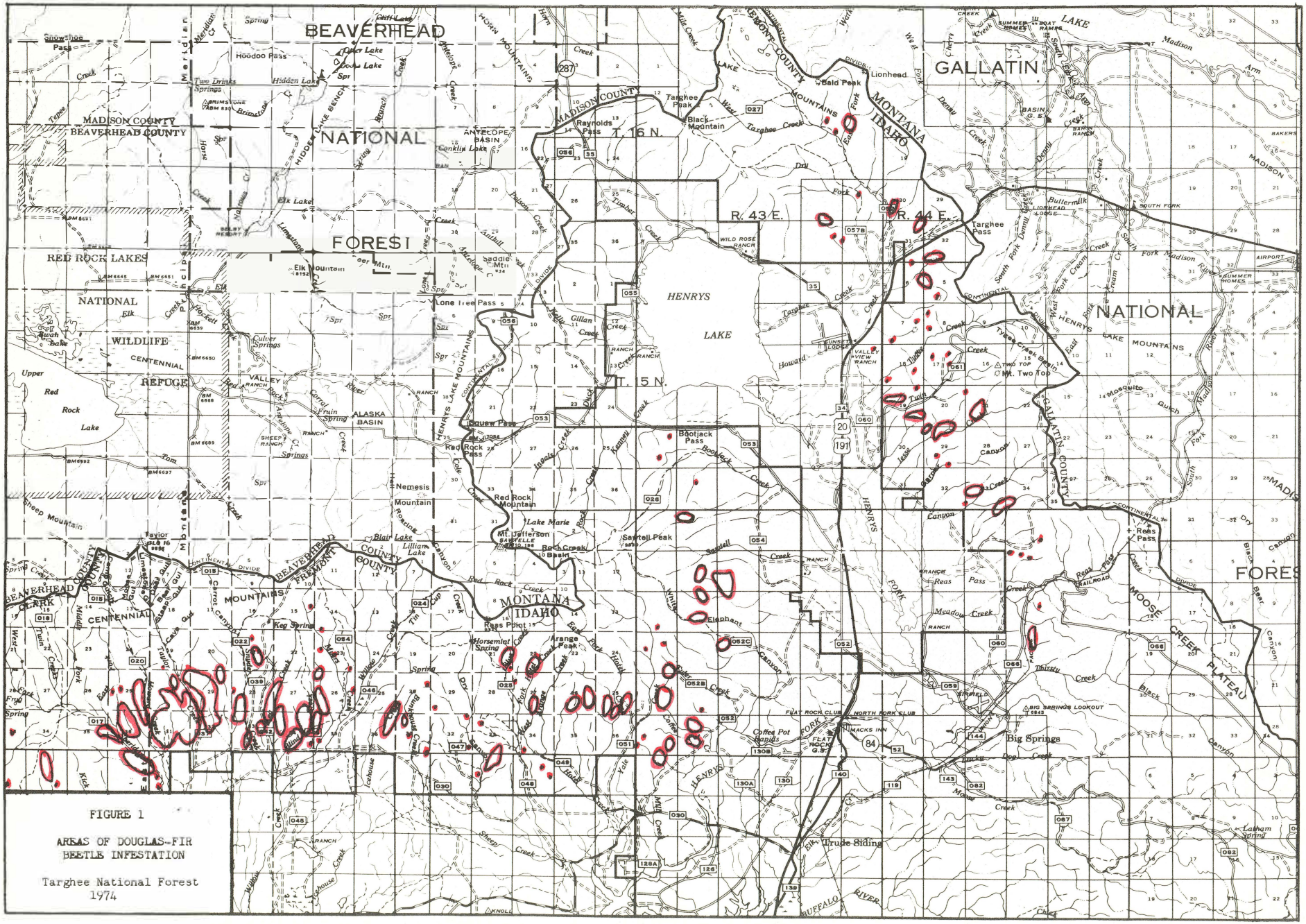

FIGURE 1

AREAS OF DOUGLAS-FIR BEETLE INFESTATION

Targhee National Forest
1974

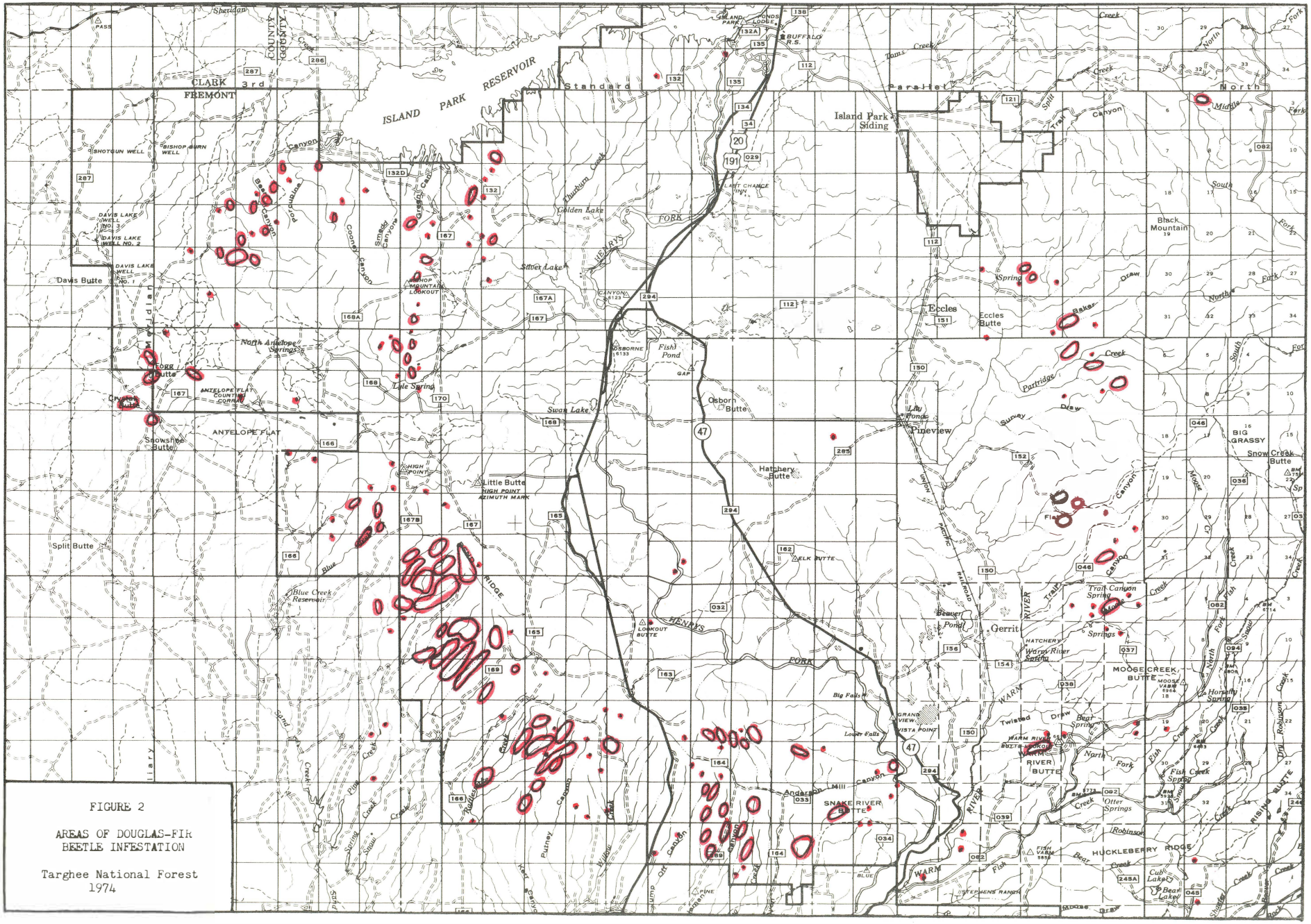

FIGURE 2

AREAS OF DOUGLAS-FIR BEETLE INFESTATION

Targhee National Forest
1974

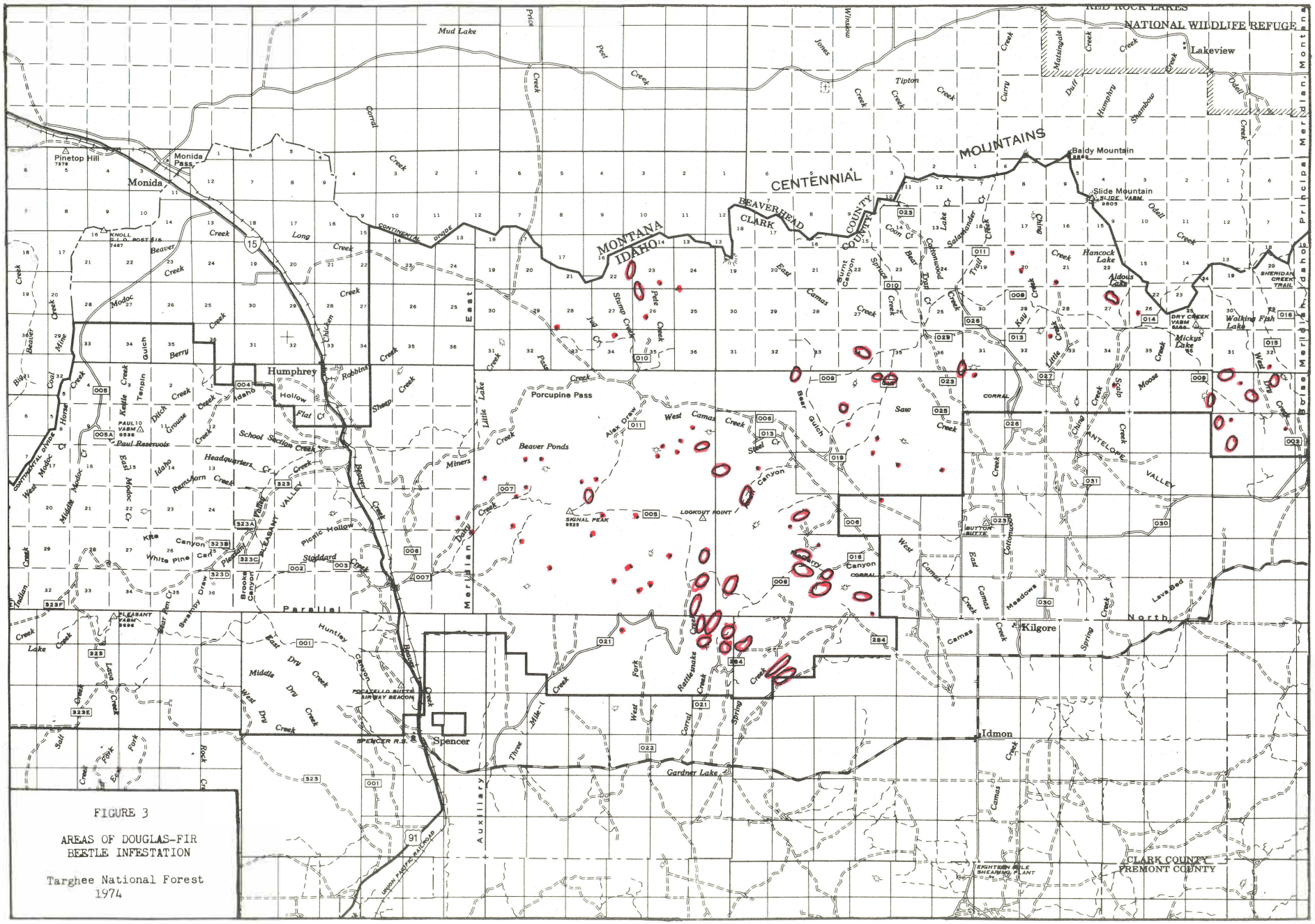

FIGURE 3

AREAS OF DOUGLAS-FIR BEETLE INFESTATION

Targhee National Forest
1974

DBH CLASS	HOST LIVE	1974 HITS	1973 HITS	1972 & BEFORE	NONHOST LIVE
6					
7	7.5				7.5
8					
9					4.5
10	7.3				3.7
11				0.2	
12	5.1				2.5
13				0.2	
14	3.7				
15	3.2			0.2	
16					1.4
17	1.3				
18	1.1				
19	1.0				
20					
21	0.8				
22	1.5				
23	0.7				
24				0.2	
25	1.8				
26					
27	0.5				
28	0.9				
29					
30					
31					
32	0.4				
43				0.2	
45	0.2				
Totals	37.0	0	0	1.0	19.6

Table 1. Douglas-fir stand structure in trees per acre with mortality by year on Thurburn Ridge, Targhee National Forest, 1974.

DBH CLASS	HOST LIVE	1974 HITS	1973 HITS	1972 & BEFORE	NONHOST LIVE
6	21.8				7.2
7					
8					
9	9.7			0.1	3.2
10	5.2				5.2
11	4.3			0.3	
12	3.6				1.8
13	4.7				1.6
14					2.7
15				0.1	
16	2.0				
17	0.9			0.1	
18	0.8			0.1	
19					
20	2.0				0.7
21				0.1	
22	1.1			0.1	
23	0.5			0.3	
24				0.1	
25	0.4				
26			0.2		
27					
28			0.1	0.1	
29	1.2				
30			0.1		
31			0.1		
32	1.0				
33	0.5			0.1	
34					
35					
37				0.1	
39				0.1	
40	0.2				
41				0.1	
Totals	59.9	0	0.5	1.8	22.4

Table 2. Douglas-fir stand structure in trees per acre with mortality by year in Reas Pass Creek, Targhee National Forest, 1974.

DBH CLASS	HOST LIVE	1974 HITS	1973 HITS	1972 & BEFORE	NONHOST LIVE
6					
7	15.0				
8					5.7
9	4.5				
10	7.3				
11	6.1	0.2			
12	7.3			0.2	
13	6.5			0.2	
14	7.5	0.2		0.2	
15	3.3				
16	2.9	0.6		0.2	
17	5.1				
18	5.7	0.4		0.4	
19		0.2		0.2	
20	0.9	0.4		0.2	
21	1.7	0.4		0.2	
22				0.2	
23		0.2		0.2	
24	0.6			0.4	
25	1.2			0.2	
26	0.5				
27	1.5				
28	0.5			0.2	
29	0.4		0.2		
30		0.2		0.2	
31				0.2	
32					
33	0.3			0.2	
34					
35					
36				0.2	
39	0.2				
Totals	79.0	2.8	0.2	3.8	5.7

Table 3. Douglas-fir stand structure in trees per acre with mortality by year in Twin Creek, Targhee National Forest, 1974.

DBH CLASS	HOST LIVE	1974 HITS	1973 HITS	1972 & BEFORE	NONHOST LIVE
6	12.7				12.7
7	4.7				
8	3.6				7.2
9	2.8				5.7
10	2.3				9.2
11	5.7			0.1	5.7
12	1.6				6.4
13	4.1				1.4
14	8.2			0.1	
15	2.0	0.1			3.1
16	2.7			0.1	1.8
17	0.8				
18	1.4			0.3	
19	0.6		0.2		
20	0.6		0.1		
21	2.1		0.1	0.3	
22	2.4			0.1	
23	1.3			0.3	
24	0.8	0.1			
25					
26	0.4			0.1	
27					
28	0.6				
29					
30					
31	0.2				
43					
Totals	61.6	0.2	0.4	1.4	53.2

Table 4. Douglas-fir stand structure in trees per acre with mortality by year in Yale Creek, Targhee National Forest, 1974.

DBH CLASS	HOST LIVE	1974 HITS	1973 HITS	1972 & BEFORE	NONHOST LIVE
6	8.5				
7	6.2				
9	18.9			0.2	
10	3.1			0.2	3.1
12					
13	5.4				
14	1.6				1.6
15	1.4				
16	3.6				
17	6.3				1.1
18	5.7				
19	2.5				
20	3.8				
21	0.7	0.2		0.2	
22				0.2	
23	0.6				
24	1.1	0.2			
25	1.0	0.2		0.3	
26	0.9			0.3	
27	0.8	0.2	0.2	0.3	
28	1.2	0.2			
29	0.4	0.1		0.3	
30	1.0				
31					
32		0.1			
33					
34					
35	0.2				
36	0.2				
37	0.2				
38					
40			0.2		
42			0.2		
45	0.2				
Totals	75.5	1.2	0.6	2.0	5.8

Table 5. Douglas-fir stand structure in trees per acre with mortality by year in Blind Creek, Targhee National Forest, 1974.

DBH CLASS	HOST LIVE	1974 HITS	1973 HITS	1972 & BEFORE	NONHOST LIVE
6	10.2				30.6
7					
8	5.7			0.2	
9	4.5			0.4	
10	6.7			0.2	
11					3.0
12				0.2	2.5
13	2.2	0.2			8.7
14					
15	6.5			0.2	1.6
16	1.4	0.2		0.2	
17	3.8			0.2	
18	3.4				
19	1.0	0.2			
20	3.7	0.4		0.4	
21	4.2	0.2		0.2	0.8
22	2.3				
23		0.6			
24	0.6		0.2	0.2	
25	1.2	0.2		0.2	
26	2.2	0.4	0.2		
27			0.2		
28			0.2		
29			0.2	0.2	
30	0.8	0.2			
31	0.8				
32		0.4			
33				0.2	
36			0.2		
38	0.3		0.2		
39	0.2				
46	0.2				
Totals	61.9	3.0	1.4	3.0	47.2

Table 6. Douglas-fir stand structure in trees per acre with mortality by year in Snyder Creek, Targhee National Forest, 1974.

DBH CLASS	HOST LIVE	1974 HITS	1973 HITS	1972 & BEFORE	NONHOST LIVE
6	8.5				8.5
7	6.2				6.2
8					9.5
9	3.8				3.8
10	3.1				
11	10.1				
12	2.1				
13					
14	3.1				3.1
15	1.4	0.3		0.2	1.4
16	3.6	0.3			
17	2.1	0.5			
18	2.8	0.2	0.5		
19	4.2	0.3	0.2		
20	3.1	0.2			
21	2.8		0.3		
22	1.3	0.3	0.3		
23	2.3	0.3	0.3		
24	1.6		0.5		
25	0.5	0.8	0.3		
26		0.2	0.3		
27		0.2	0.5		
28	0.4	0.2	0.3		
29			0.3	0.2	
30	0.7	0.2	0.3	0.2	
31	0.3	0.3	0.3	0.2	
32	0.3		0.2		
33			0.3		
34	0.5				
38		0.2	0.2		
41					
43			0.2		
45				0.2	
53	0.1				
Totals	64.9	4.5	5.3	1.0	32.5

Table 7. Douglas-fir stand structure in trees per acre with mortality by year in Taylor Creek, Targhee National Forest, 1974.

DBH CLASS	HOST LIVE	1974 HITS	1973 HITS	1972 & BEFORE	NONHOST LIVE
7	6.2				
8					9.5
9	11.3			0.2	
10	12.2				
11				0.2	
12	8.5				2.1
13	7.2				
14	1.6		0.2	0.2	
15	1.4				
16	3.6				
17	6.3				
18	4.7			0.2	
19	3.4			0.2	
20	2.3				
21	2.8				
22	2.5		0.7		
23	1.2		0.8		0.6
24	1.1		0.2	0.2	
25			0.2		
26	1.4	0.2	0.2		
27	1.7	0.2	0.3	0.2	
28		0.2	0.2		
29					
30					
31	0.4		0.2		
32			0.7		
33	0.3			0.2	
34			0.5		
35					
37				0.2	
38		0.1			
39	0.2		0.2		
41					
Totals	80.3	0.7	4.4	1.8	12.2

Table 8. **Douglas-fir stand structure in trees per acre with mortality by year in Howard Creek, Targhee National Forest, 1974.**